INTELLECTUAL VENTURES
v.
T-Mobile & Ericsson
Case No. 17-cv-0577-JRG

Plaintiff's Claim Constructions
Claim Construction Hearing
September 5, 2018

Term 1: “in an isochronous manner”

"in an isochronous manner"

IV's Construction	Defendants' Construction
"in a manner which provides for consistent timed access"	"according to a consistent time interval"

1. A method for assigning future slots of a transmission frame to a data packet in the transmission frame for transmission over a wireless medium, comprising:

applying a reservation algorithm;

reserving a first slot for a first data packet of an internet protocol (IP) flow in a future transmission frame based on said reservation algorithm; and

reserving a second slot for a second data packet of said IP flow in a transmission frame, subsequent in time to said future transmission frame based on said reservation algorithm,

wherein said second data packet is placed in said second slot in an isochronous manner to the placing of said first data packet in said first slot.

'629 Patent, claim 1

*This term appears in '629, claim 1, '971, claim 12, and '206 claim 123.

IV's construction taken from specification

IV's Construction

"in a manner which provides for consistent timed access"

- IV's construction is expressly supported by the specification.

with reference to a circuit-centric definition of QoS. In this definition, QoS implied the ability to carry asynchronous (i.e. transmission of data through start and stop sequences without the use of a common clock) as well as isochronous (i.e.consistent timed access of network bandwidth for time-sensitive voice and video) traffic. Circuit-switched QoS was

'629 Patent at 13:55-60

respect to FIGS. **8**A and **8**B. For calls that are sensitive to jitter, meaning calls that are time sensitive, it is important to maintain an isochronous (i.e., in phase with respect to time) connection. With such signals, it is important that the data be

'629 Patent at 61:41-44

* '971 and '206 Patent specifications are identical to the '629 Patent specification for cited passages

Figure 14 depicts exemplary isochronous patterns

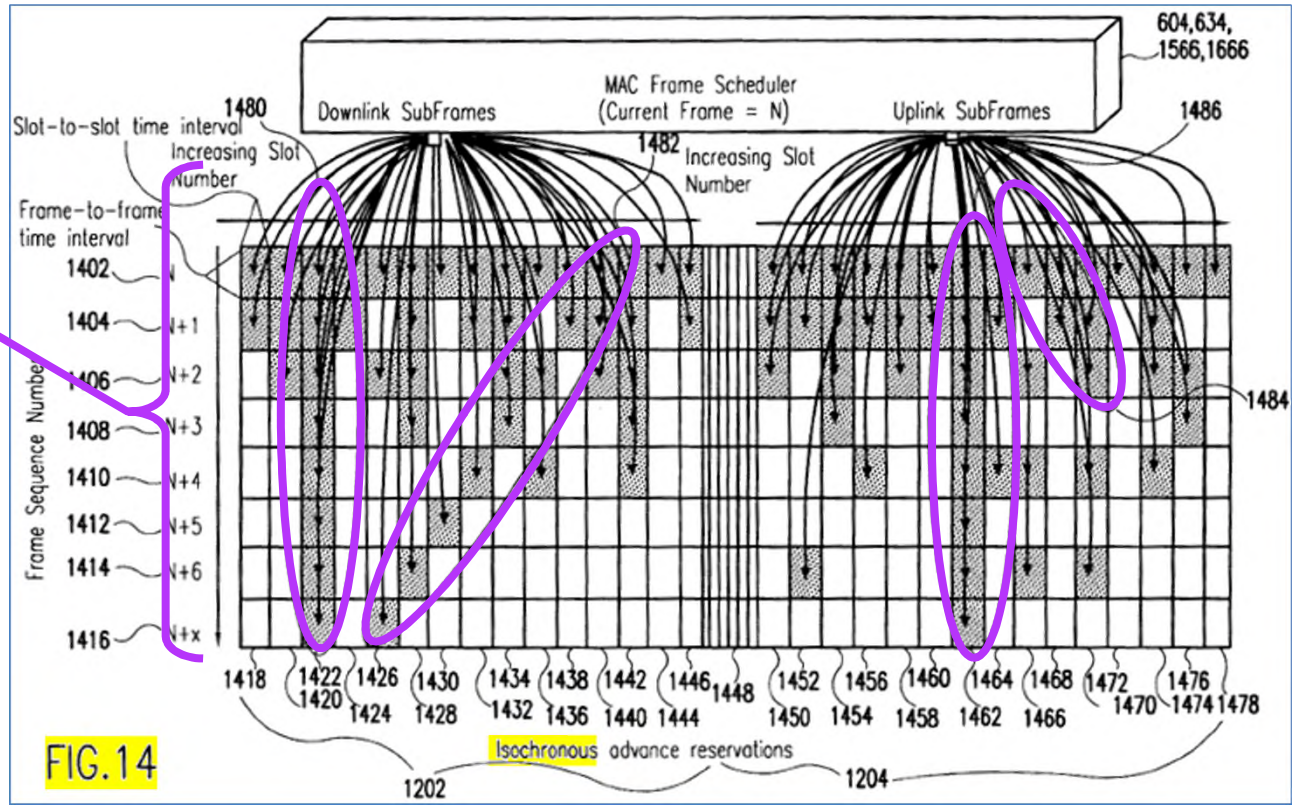
IV's Construction

"in a manner which provides for consistent timed access"

- Fig. 14 depicts two of many examples in which packets are scheduled in a manner which provides consistent timed access.

Examples of isochronous reservations
(1480, 1482, 1484, 1486)

'629 Patent at 61:41-44, 61:66-67



Defendants say their construction means "in phase with respect to time"

> The patents define an isochronous connection as one that is "in phase with respect to time" or, in more common parlance, delivers packets at consistent time intervals:

Defendants' Brief (D.I. 118) at 11

- IV is willing to accept the actual language from the specification ("in phase with respect to time"), which Defendants say is equivalent to their proposed definition.

"according to a consistent time interval" not supported

- Defendants rejected both definitions from the specification.
- Defendants' construction introduces "interval," which does not appear in the specification's definition.
- Defendants are rewriting the specification's definition by arguing their construction is "more layman-friendly."

Term 2: “periodic variation”

"periodic variation"

IV's Construction	Defendants' Construction
Plain meaning, "regular variation of the location within frames into which the data is successively placed"	"changing of the placement between frames, while maintaining a consistent time interval"

3. The method of claim 1, wherein there is no periodic variation between the placing of said first data packet in said first slot and the placing of second data packet in said second slot.

'629 Patent, claim 3

*This term appears in '629, claim 3 and '971, claim 14

Defendants' construction provides no clarity

- Defendants' construction is unhelpful and confusing in the context of the claims.
- Inserting Defendants' construction into '629 Patent, claim 3 results in:

> 3. The method of claim 1, wherein there is no [**changing of the placement between frames, while maintaining a consistent time interval**] between the placing of said first data packet in said first slot and the placing of second data packet in said slot.

- The relationship between "frames," "slots," and "consistent time interval" is unclear.

IV's construction is taken from specification

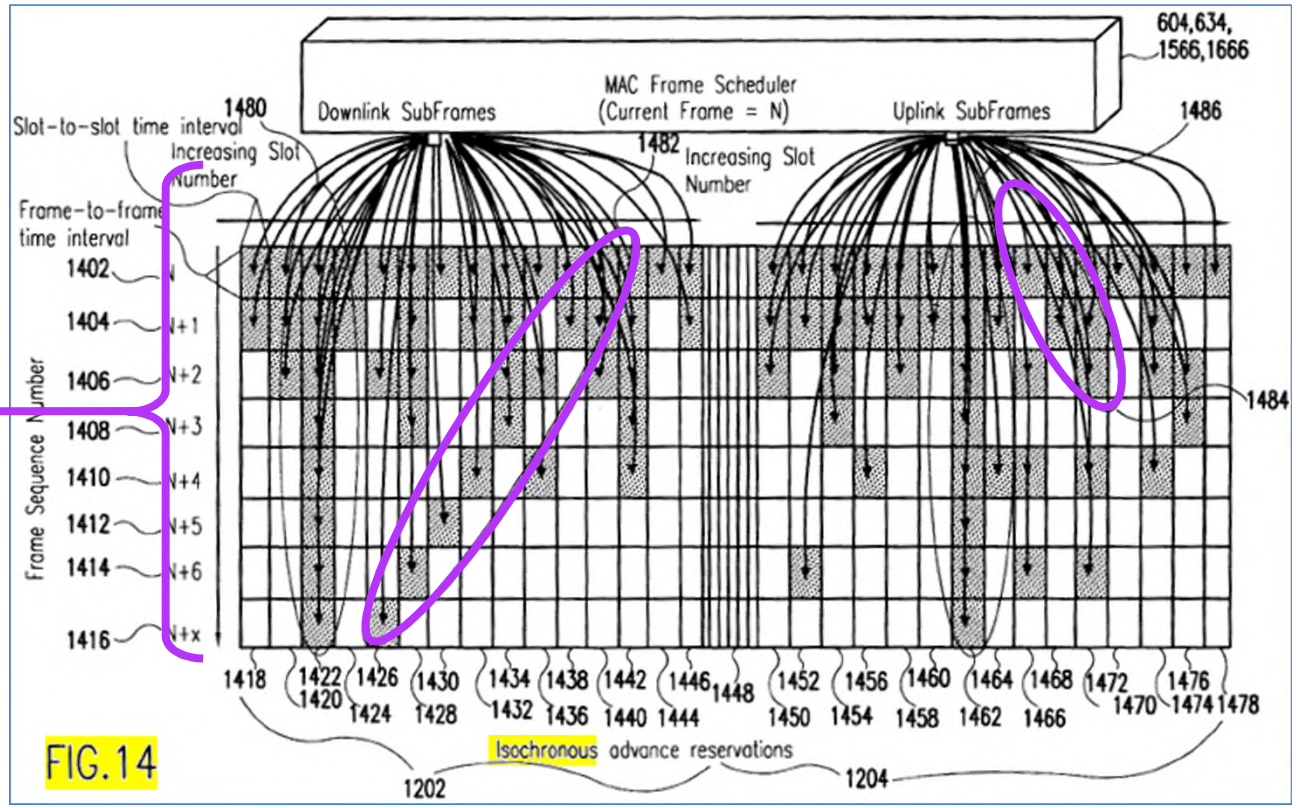
IV's Construction

Plain meaning, regular variation of the location within frames into which the data is successively placed.

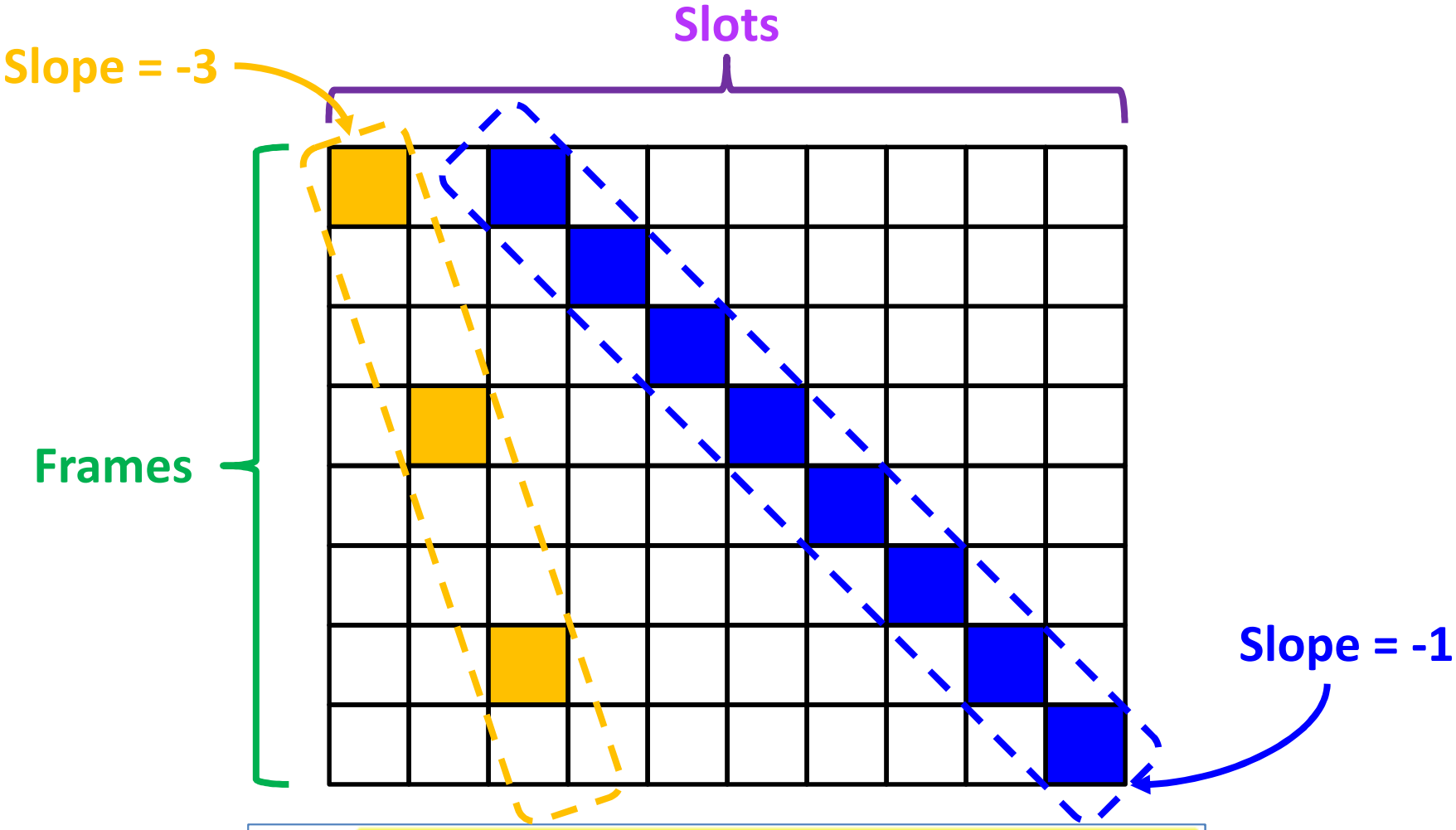
- The specification supports IV's construction. *See, e.g.* Figure 14.

Examples of periodic variation
(1482 & 1486)

'629 Patent at 61:51-56



Periodic – single and multiple frame jump



1486. The diagonal reservation **1482** can also be more pronounced (i.e., using a greater or lesser slope), depending on the period between sequential frames desired. Reserva-

'629 Patent at 61:63-65

IV's construction best captures meaning

- Plain meaning will suffice here, as the experts understand the term.
- Construction must cover diagonal patterns with slope > 1, *i.e.,* empty frames.
- "Regular variation of the location within frames into which the data is successively placed" better conveys the meaning of the term.

Term 4: “host workstation”

"host workstation"

IV's Construction	Defendants' Construction
Plain meaning, "a computer or other device that communicates with other computers on a network and includes a terminal or interface to accept input"	Construction in 4-3: "end-point running one or more applications and serving as the source or destination of an IP flow to or from a subscriber end-point" "Clarified" construction in brief: "end-point running one or more applications and capable of serving as the source or destination of an IP flow to or from a subscriber end-point"

12. A quality of service (QoS) aware, wireless communications system comprising:

a wireless access point base station coupled to a first data network;

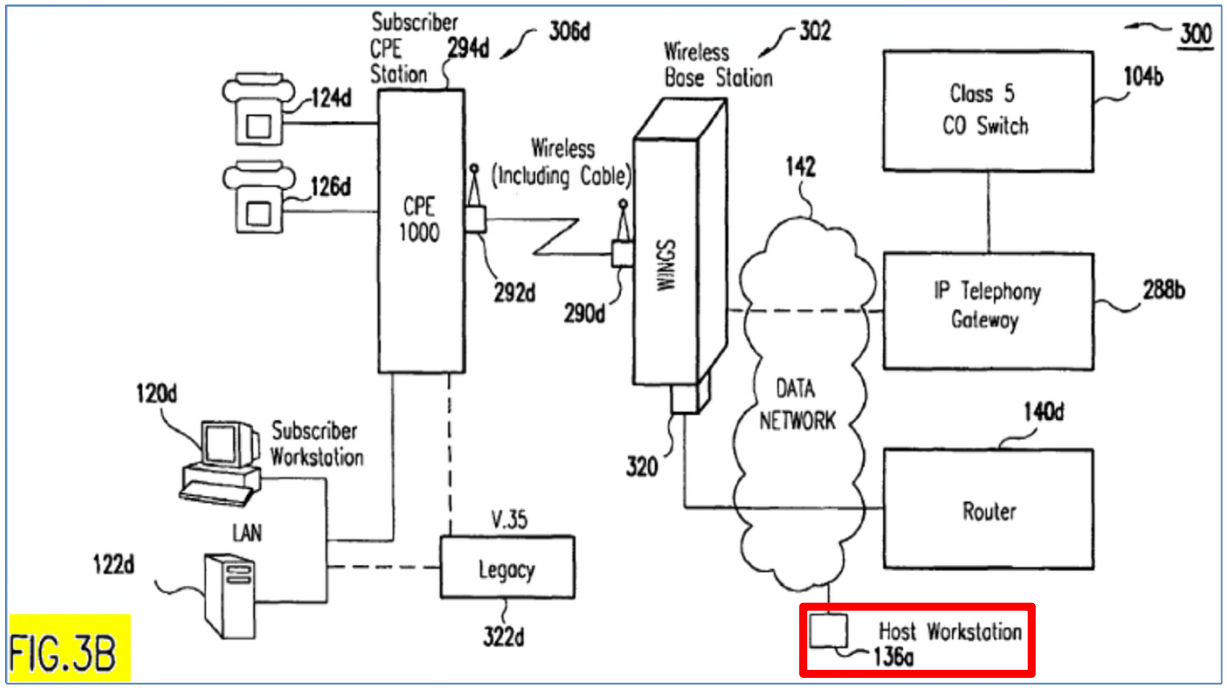
one or more host workstations coupled to said first data network;

one or more wireless network stations in wireless communication with said wireless access point base station over a shared wireless network using a packet-centric protocol; and

'971 Patent, claim 12

The specification supports IV's construction

- "Host workstation," "host computer," and "server" are used interchangeably in the '971 specification:



Network **148** includes an example local area network including a plurality of host computers such as, e.g., client workstation **138** and server **136**, coupled together by wiring including network interface cards (NICs) and a hub, such as, e.g., an Ethernet hub. The LAN is coupled to data network

'971 Patent at 30:49-56

Defendants' construction improperly attempts to limit the term

- First, Defendants limit this term by requiring that the relevant flow be always capable of flowing "to or from a subscriber end-point."

- But the intrinsic record includes examples of host workstations communicating with other host workstations.
  - Examples from the specification do not require communication with subscriber end-points.

networks including both LANs and WANs. Communication occurs between host computers on one LAN and host computers on another LAN via, for example, an internet protocol (IP) protocol. The IP protocol is used to assign each

'971 Patent at 32:6-9

Defendants' construction improperly attempts to limit the term

- Second, Defendants require "host computers" to be configured to use a specific protocol; namely Internet Protocol ("IP").

- But the intrinsic record uses IP protocol in an exemplary manner, and the plain language of the claim does not limit this term.

networks including both LANs and WANs. Communication occurs between host computers on one LAN and host computers on another LAN via, for example, an internet protocol (IP) protocol. The IP protocol is used to assign each

'971 Patent at 32:6-9

Defendants' construction improperly attempts to limit the term

- Third, Defendants' construction requires "host workstations" to serve as "end-points."

- Defendants do not define "end-point," and the specification never uses the word "end-point" in connection with describing a "host workstation."

Terms 5, 6, 7, & 9: “Optimize” Terms

"Optimize" terms: the parties' positions

IV's Construction	Defendants' Construction
"so as to differentiate between types of traffic or service types and allocate a different level of system resources to said IP flow"	Indefinite. Issue preclusion applies.

'206 Patent:

1. A method for IP flow classification grouping IP flows in a packet-centric wireless point to multi-point telecommunications system, said method comprising: …

allocating said shared wireless bandwidth to communication of said IP flow between said wireless base station and a subscriber CPE station**, so as to optimize end-user quality of service (QoS) associated with said IP flow**.

19. The method according to claim 1, further comprising:

allocating shared wireless bandwidth to said subscriber CPE station **so as to optimize end-user internet protocol (IP) quality of service (QoS)**.

121. The method according to claim 109, the step of scheduling further comprising:

allocating resources of said shared wireless bandwidth among a plurality of wireless network stations **to optimize end-user quality of service (QoS) for an Internet Protocol (IP) flow**.

'971 Patent:

12. A quality of service (QoS) aware, wireless communications system comprising: ...

a scheduler that allocates resources of said shared wireless network among said wireless network stations **to optimize end-user quality of service (QoS) for an Internet Protocol (IP) flow**, wherein said IP flow is associated with at least one of a latency-sensitive and a jitter-sensitive application;

Claim structure built around network management of a specific IP flow

1. A method for IP flow classification grouping IP flows in a packet-centric wireless point to multi-point telecommunications system, said method comprising:

analyzing an Internet Protocol (IP) flow in a packet-centric manner;

classifying said IP flow; and

scheduling said IP flow for transmission over a shared wireless bandwidth between a wireless base station and at least one subscriber customer premises equipment (CPE) station, including

allocating said shared wireless bandwidth to communication of said IP flow between said wireless base station and a subscriber CPE station, so as to optimize end-user quality of service (QoS) associated with said IP flow.

'206 Patent, claim 1

Invention is directed to network engineers

- A network administrator "centraliz[es] the control of scheduling" by defining end user QoS parameters for different flows.

request from the CPE station. By placing all scheduling function at the wireless base station **302**, overall system quality of service can be optimized by centralizing the control of scheduling.

'206 Patent at 51:14-16

- The network administrator creates a QoS matrix to manage the network operation.

access system use all of these methods to differentiate traffic into classes of service, to map these classes of service against a QoS matrix, and thereby to simplify the operation and administration of the QoS mechanism.

'206 Patent at 14:22-25

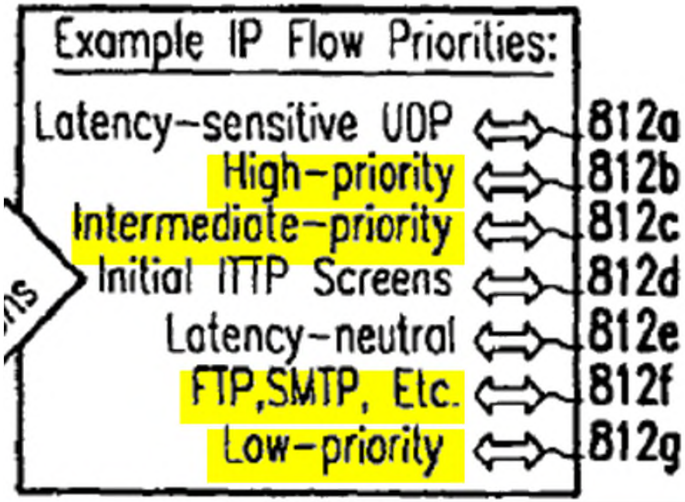
- Users have no understanding of "IP flows" or even know what IP packets are.

QoS

IV's Construction

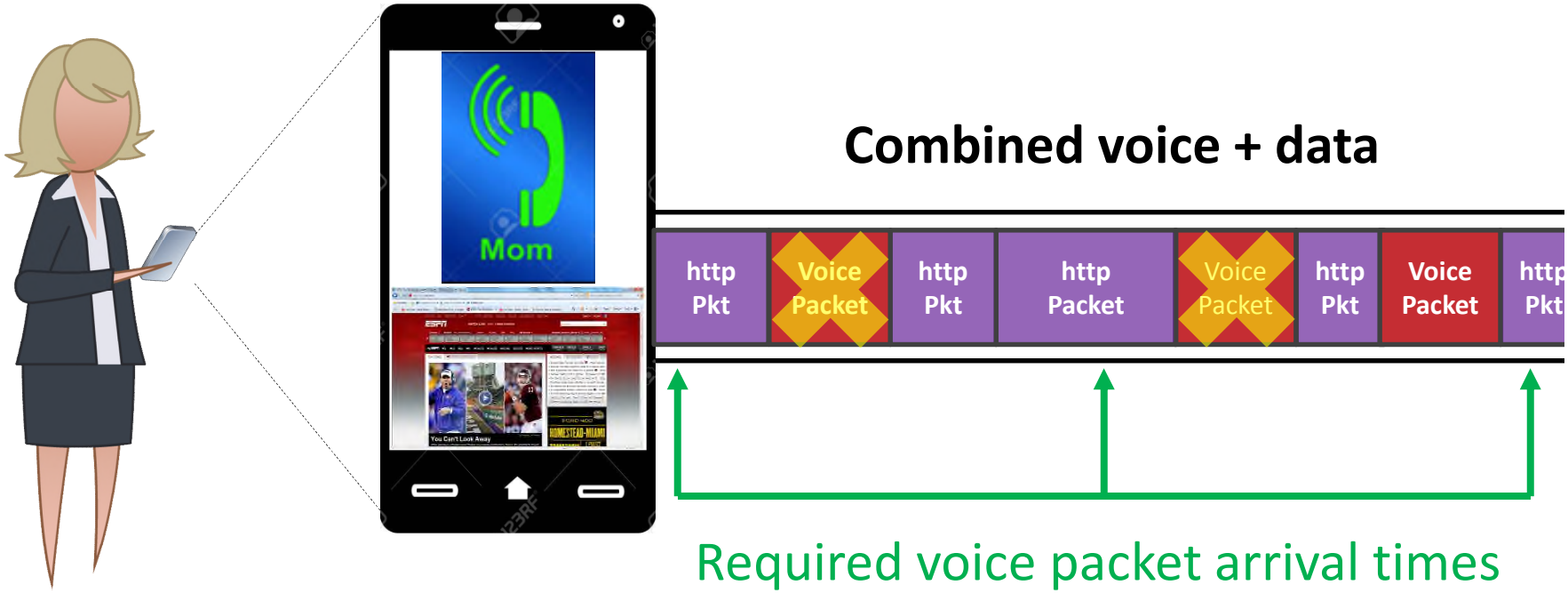
"so as to differentiate between types of traffic or service types and allocate a different level of system resources to said IP flow"

- "QoS can be thought of as a mechanism to selectively allocate scarce … resources to differentiated classes of network traffic with appropriate levels of priority." '206 Patent at 12:7-10.
- Specification specifies metrics to prioritize data flows. '206 Patent at 11:31-38.

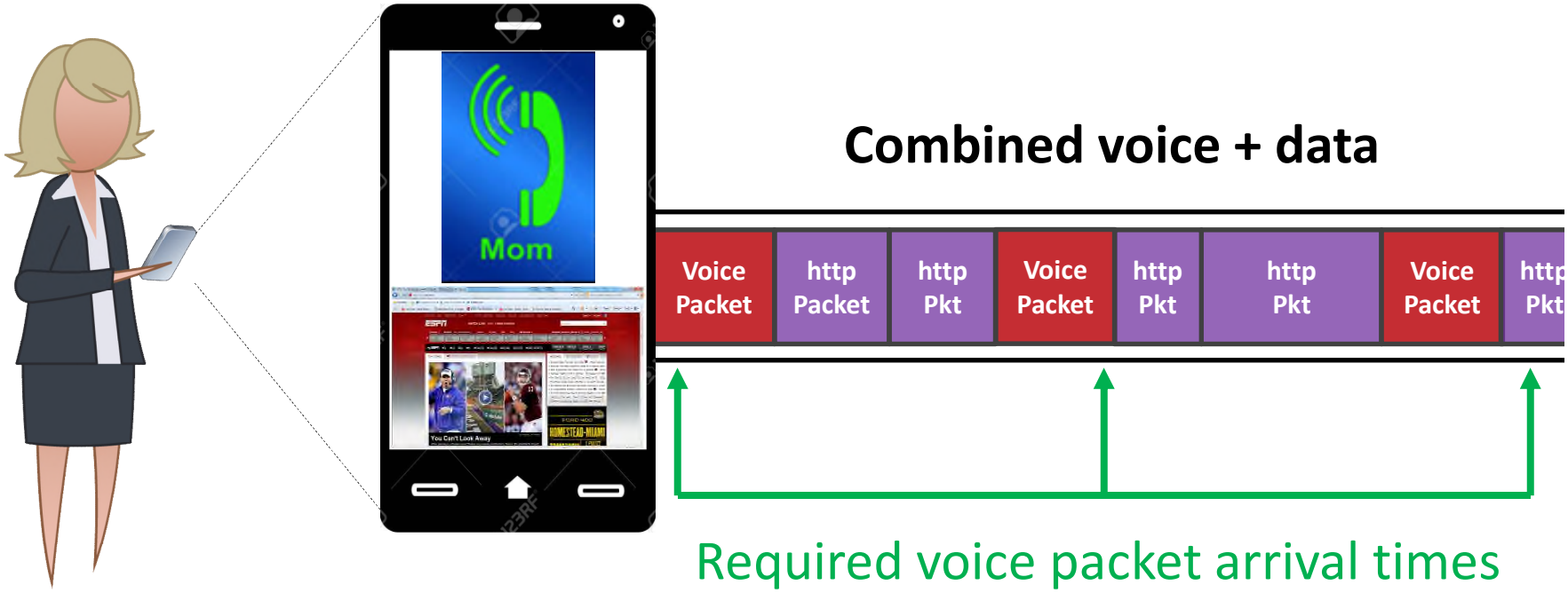


'206 Patent at Fig. 8A & 8B

Voice over IP flow – not optimized



Voice over IP flow – optimized



- Invention creates ability to prioritize voice packets to ensure on time arrival, guaranteeing optimal QoS.

Specification equates optimizing an IP flow with prioritizing

ments of each IP flow. By using QoS requirements to build the wireless transmission frames, optimal QoS performance can result over the entire range of applications being handled by the system. For example, latency and jitter sensitive IP telephony, other H.323 compliant IP streams, and real-time audio and video streams can be given a higher priority for optimal placement in the wireless transmission frames. On

'206 Patent at 21:41-50

Specification discloses prioritizing voice IP flow

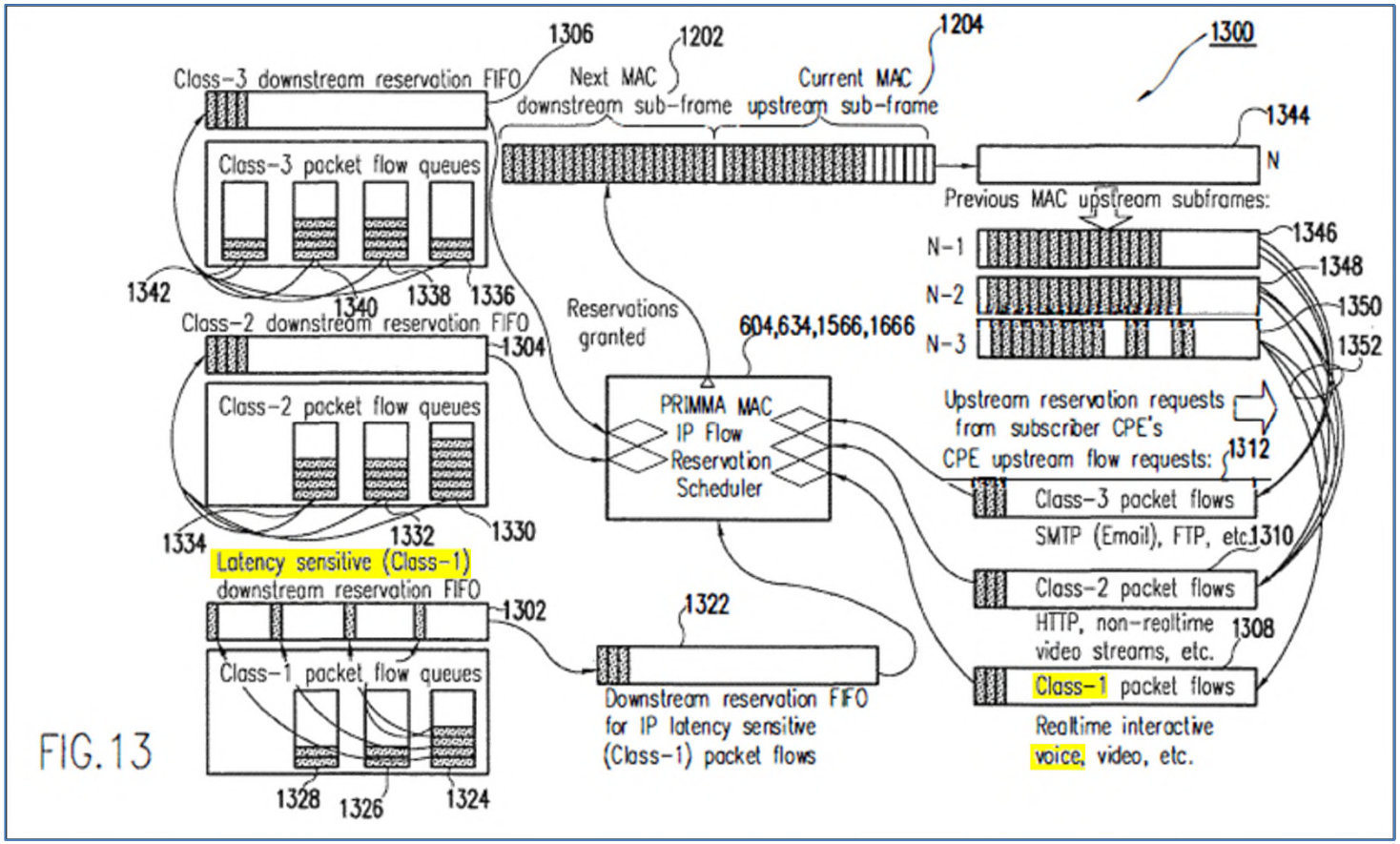
- Specification describes how the advanced reservation algorithm can be used to give voice calls higher priority:

> Using these principles, the advanced reservation algorithm can assign the slots from highest priority to lowest priority, exhausting the number of available slots in future frames. IP data flows that are both jitter and latency sensitive can be assigned slots with periodic patterns first (e.g., patterns **1480**, **1482**, **1484** and **1486**), followed by flows that are highly latency sensitive (but not jitter sensitive), et cetera, until the flows of lowest latency sensitivity are assigned to slots. Prioritization of different classes of IP

'206 Patent at 60:20-26

Specification discloses prioritizing voice IP flow

- Specification describes how the advanced reservation algorithm can be used to give voice calls higher priority:



'206 Patent at Fig. 13

Specification supports IV's construction

IV's Construction

"so as to differentiate between types of traffic or service types and allocate a different level of system resources to said IP flow"

- IV's proposed construction is taken directly from the specification.

5. Class of Service and Quality of Service

In order to implement a practical QoS mechanism, it is desired that a system be able to differentiate between types of traffic or service types so that differing levels of system resources can be allocated to these types. It is customary to speak of "classes of service" as a means of grouping traffic types that can receive similar treatment or allocation of system and media resources.

'206 Patent at 14:9-16

Prosecution history supports IV's construction

IV's Construction

"so as to differentiate between types of traffic or service types and allocate a different level of system resources to said IP flow"

The present invention ***optimizes*** end-user quality of service (QoS) by ***differentiating between types of traffic or service types*** so that differing levels of system resources can be allocated to these different types. See Specification, from line 23 of page 24 to line 2 of page 25; page 97, lines 14-18; page 119, lines 1-6. By creating a finite number of ***discrete classes of service***, multiple IP flows can be consolidated and handled with a given set of ***QoS*** parameters by the QoS mechanisms. See Specification, page 31, lines 21-22. As discussed in detail below, Meier does ***not*** teach or suggest ***a resource allocator*** that allocates shared bandwidth to the subscriber CPE station and ***optimizes end-user quality of service (QoS)***.

'478 App. FH, Mar. 27, 2002 Amendment at 13-14 (D.I. 111-06)

Prosecution history supports IV's construction

IV's Construction

"so as to differentiate between types of traffic or service types and allocate a different level of system resources to said IP flow"

- The Applicant distinguished prior art:

> Meier's system has no awareness of the contents of packets, and has no knowledge of specific application needs of the packet so as to be able to tailor any special bandwidth allocation to the packet. Thus Meier cannot and does not allocate bandwidth to optimize QoS.
>
> Meier ***fails*** to disclose a resource allocator that ***optimizes end-user quality of service (QoS)***. End-user quality of service (QoS) is not optimized in Meier because ***differentiating between types of traffic or service types*** is required in order to ***optimize*** end-user quality of service (***QoS***). Meier does not differentiate between traffic types. Transmitting HELLO

Ex. 5 at 14; *see also* Ex. 5 at 13

Defendants' construction: indefinite

Defendants' Construction

"Here, 'optimize' is an indefinite, subjective term of degree that varies based on user preferences . . ." Defs. Br. at 6.

- Key errors in Defendants' analysis:
  - Failure to address concept of optimizing for a selected IP flow.
  - Refusing to focus on network engineers as audience for patent.
  - Failure to address language in '971 Patent, claim 12.

Claim construction + indefiniteness

1. Proper methodology is to first construe the claims using the tools available to construe all patent claims – intrinsic and extrinsic record.
   - *Huawei Techs. Co. Ltd. v. T-Mobile US, Inc.*, No. 2:16-CV-00057-JRG-RSP, 2017 WL 2691227, at *23 (E.D. Tex. June 22, 2017).

2. Second step is to determine whether the construed claim meets the reasonable certainty test of *Nautilus*.

3. IV has offered a well-supported claim construction that makes sense, and is consistent with the specification and the file history.

4. Defendants assert that the inventors intended to claim the subjective views of cell phone users about an IP flow.

No indefiniteness

- It is Defendants' burden to establish indefiniteness by clear and convincing evidence.

- Indefiniteness is determined from the perspective of POSITA, which is a question of fact.
  - *Nautilus, Inc. v. Biosig Instrs., Inc.,* 134 S. Ct. 2120, 2130 (2014).

- Indefiniteness-related fact questions are subject to the same rules of evidence and procedure as other factual disputes.
  - *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 834 (2015) .

- Competing expert opinions may preclude indefiniteness.
  - *Sonix Tech. Co. v. Publ'ns Int'l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017) (expert's opinion "provides[s] evidence that skilled artisan did understand scope of this invention with reasonable certainty")

Optimize is not indefinite

- Defendants ignore the context of the claim language; namely, that an IP flow is optimized.
  - Allocating resources to an IP flow based on its priority and QOS requirements results in optimizing the IP flow.
  - Patent describes how to optimize an IP flow by using isochronous reservation patterns, periodic variation, etc. '206 Patent at 58:28-60:28.
  - '971 Patent, Claim 12 explicitly requires placing data packets in an isochronous manner.

’971 Patent, claim 12 limited to isochronous traffic

a scheduler that allocates resources of said shared wireless network among said wireless network stations to optimize end-user quality of service (QoS) for an Internet Protocol (IP) flow, wherein said IP flow is associated with at least one of a latency-sensitive and a jitter-sensitive application;

wherein said scheduler comprises assigning means for assigning future slots of a transmission frame to a portion of said IP flow in said transmission frame for transmission over said shared wireless network,

wherein said assigning means comprises:

means for applying an advanced reservation algorithm:

means for reserving a first slot for a first data packet of an Internet Protocol (IP) flow in a future transmission frame based on said algorithm:

means for reserving a second slot for a second data packet of said IP flow in a transmission frame subsequent in time to said future transmission frame based on said algorithm,

wherein said second data packet is placed in said second slot in an isochronous manner to the placing of said first data packet in said first slot.

QoS

- Defendants cite to parts of the specification that refer to providing high quality of service as a goal:
  - QoS is "a relative term, finding different meanings to different users." '206 Patent at 11:41-42.
  - QoS is best understood "as a continuum, defined by what network performance characteristic is important to a particular user and the user's SLA." '206 Patent at 11:51-54.
  - "Ultimately, the end-user experience is the final arbiter of QoS." '206 Patent at 13:30-31.
  - The patent's QoS mechanism "provides the user with the optimal service, in whatever manner the user defines it." '206 Patent at 12:14-17.

  Defs. Br. at 6.
- These soundbites do not address the meaning of the words in the asserted claims.

"QoS as a mechanism"

3. QOS as a Mechanism

QoS can be thought of as a mechanism to selectively allocate scarce networking, transmission and communications resources to differentiated classes of network traffic with appropriate levels of priority. Ideally, the nature of the data traffic, the demands of the users, the conditions of the network, and the characteristics of the traffic sources and destinations all modify how the QoS mechanism is operating at any given instant. Ultimately, however, it is desirable that the QoS mechanism operate in a manner that provides the user with optimal service, in whatever manner the user defines it.

'206 Patent at 12:6-17

Claims are directed to network engineers

- Defendants deny the claims must be interpreted from the viewpoint of network operator. Second Williams Dec. ¶¶ 5-7.
  - Network operators do not ask end-user customers for their subjective views regarding IP flows.
  - Even if a user's preferences for an application (*e.g.*, web browsing) were important, optimizing an IP flow is a decision made at the network administrator level. Second Williams Dec. ¶¶ 8-9.
  - It makes no sense to construe claims as requiring user input when users do not understand what an "IP flow" is.

Expert evidence

- IV's expert, Dr. Williams, testified:
  - A POSITA would understand that the claims require network operator to "differentiate between type of traffic of service types and allocate a different level of system resources to an IP flow." (Williams Dec. ¶ 16-28.)
  - QoS is a well-understood term in telecommunications. (Second Williams Dec. ¶ 5.)
  - Patents teach how to optimize an IP flow by applying a set of parameters (e.g., maximum delay between packets) to achieve a desired set of metrics for an IP flow of a particular type.(Second Williams Dec. ¶¶ 10-11.)

Issue preclusion does not apply

Conditions for issue preclusion are not met:

1. Issue under consideration is identical to the issue litigated in the prior action;
2. Issue was fully and vigorously litigated in the prior action;
3. Issue was necessary to support the prior judgment; and
4. No special circumstance that makes it unfair to apply issue preclusion doctrine.

Allergan Sales, LLC v. Sandoz, Inc.,
211 F. Supp. 3d 907, 914 (E.D. Tex. 2016)

No identicality

Unlike the present claims, the prior-litigated claims were drafted in means-plus-function format:

'248 Patent, Cl. 20	'971 Patent, Cl. 12	'206 Patent, Cl. 1
"allocating means for allocating resources to said IP flow, responsive to said identifying means, so as to **optimize** end user application IP QoS requirements of said software application, wherein said resource allocating means allocates resources in a packet-centric manner that is not circuit-centric and does not use asynchronous transfer mode (ATM)."	"a scheduler that allocates resources of said shared wireless network among said wireless network stations to **optimize** end-user quality of service (QoS) for an Internet Protocol (IP) flow, wherein said IP flow is associated with at least one of a latency-sensitive and a jitter-sensitive application;"	"allocating said shared wireless bandwidth to communication of said IP flow between said wireless base station and a subscriber CPE station, so as to **optimize** end-user quality of service (QoS) associated with said IP flow."

No identicality

The present claims call for optimizing QOS for an **IP flow**, whereas the prior-litigated called for optimizing QOS for a **software application**:

'248 Patent, Cl. 20	'971 Patent, Cl. 12	'206 Patent, Cl. 1
"allocating means for allocating resources to said IP flow, responsive to said identifying means, so as to **optimize** end user application IP QoS requirements of said software application, wherein said resource allocating means allocates resources in a packet-centric manner that is not circuit-centric and does not use asynchronous transfer mode (ATM)."	"a scheduler that allocates resources of said shared wireless network among said wireless network stations to **optimize** end-user quality of service (QoS) for an Internet Protocol (IP) flow, wherein said IP flow is associated with at least one of a latency-sensitive and a jitter-sensitive application;"	"allocating said shared wireless bandwidth to communication of said IP flow between said wireless base station and a subscriber CPE station, so as to **optimize** end-user quality of service (QoS) associated with said IP flow."

No identicality

The present claims optimize QoS in a **shared wireless network,** whereas the prior-litigated claims were agnostic in this respect:

'248 Patent, Cl. 20	'971 Patent, Cl. 12	'206 Patent, Cl. 1
"allocating means for allocating resources to said IP flow, responsive to said identifying means, so as to **optimize** end user application IP QoS requirements of said software application, wherein said resource allocating means allocates resources in a packet-centric manner that is not circuit-centric and does not use asynchronous transfer mode (ATM)."	"a scheduler that allocates resources of said shared wireless network among said wireless network stations to **optimize** end-user quality of service (QoS) for an Internet Protocol (IP) flow, wherein said IP flow is associated with at least one of a latency-sensitive and a jitter-sensitive application;"	"allocating said shared wireless bandwidth to communication of said IP flow between said wireless base station and a subscriber CPE station, so as to **optimize** end-user quality of service (QoS) associated with said IP flow."

No identicality

The ’248 patent requires optimizing “QoS requirements” (i.e., multiple) for multiple IP flows whereas only ’971/’206 patents require only optimizing **QoS for a single IP flow**:

’248 Patent, Cl. 20	’971 Patent, Cl. 12	’206 Patent, Cl. 1
“allocating means for allocating resources to said IP flow, responsive to said identifying means, so as to **optimize** end user application IP QoS requirements of said software application, wherein said resource allocating means allocates resources in a packet-centric manner that is not circuit-centric and does not use asynchronous transfer mode (ATM).”	“a scheduler that allocates resources of said shared wireless network among said wireless network stations to **optimize** end-user quality of service (QoS) for an Internet Protocol (IP) flow, wherein said IP flow is associated with at least one of a latency-sensitive and a jitter-sensitive application;”	“allocating said shared wireless bandwidth to communication of said IP flow between said wireless base station and a subscriber CPE station, so as to **optimize** end-user quality of service (QoS) associated with said IP flow.”

No identicality

- Dependent claim limitations provide further distinctions from ’248 patent, claim 20:
  - “taking into account service level agreement (SLA) based priorities” for an IP flow when allocating bandwidth and scheduling that IP flow for transmission. (’971 Patent, claim 18 & ’206 Patent, claims 38, 41 & 129.)
  - Management system to control the packet scheduler in its classification and scheduling of data packets. (’971 Patent, claim 26 & ’206 Patent, claims 115 & 135.)

Term 11: “assigning means”

"assigning means for assigning future slots of a transmission frame to a portion of said IP flow in said transmission frame for transmission over said shared wireless network"

12. A quality of service (QoS) aware, wireless communications system comprising:

...

wherein said scheduler comprises assigning means for assigning future slots of a transmission frame to a portion of said IP flow in said transmission frame for transmission over said shared wireless network,

wherein said assigning means comprises:

'971 Patent, claim 12

IV's Construction	Defendants' Construction
Structure: MAC subframe schedulers 1566 or 1666	Structure: MAC downlink subframe scheduler 1566 or MAC uplink subframe scheduler 1666, implementing an algorithm that assigns future slots to a portion of an IP flow based on the priority of the IP flow, as described at '971 Patent 61:65-62:11
Function: "assigning future slots of a transmission frame to a portion of said IP flow in said transmission frame for transmission over said shared wireless network"	Function: "assigning future slots of a transmission frame to a portion of said IP flow in said transmission frame for transmission over said shared wireless network"

Additional functions of the "assigning means"

- The "assigning means" comprises three MPF elements:

wherein said assigning means comprises:
1. means for applying an advanced reservation algorithm:
2. means for reserving a first slot for a first data packet of an Internet Protocol (IP) flow in a future transmission frame based on said algorithm:
3. means for reserving a second slot for a second data packet of said IP flow in a transmission frame subsequent in time to said future transmission frame based on said algorithm,

'971 Patent, claim 12

- A proper construction must be broad enough to encompass all three MPF elements.
- Because the "assigning means" includes an "advanced reservation algorithm," it is not necessary to construe the "assigning means" itself to require some other algorithm, as Defendants propose.

Term 12: “means for applying an advanced reservation algorithm”

"means for applying an advanced reservation algorithm"

> 12. A quality of service (QoS) aware, wireless communications system comprising:
>
> ...
>
> wherein said scheduler comprises assigning means for assigning future slots of a transmission frame to a portion of said IP flow in said transmission frame for transmission over said shared wireless network,
>
> wherein said assigning means comprises:
>
> means for applying an advanced reservation algorithm:

'971 Patent, claim 12

IV's Construction	Defendants' Construction
Structure: MAC subframe schedulers 1566 or 1666 configured to assign future slots to data packets based on the priority of the IP data flow with which the packet is associated, as described at '971 Patent 23:14-35, 61:35-62:56, 63:47-57, 66:7-15, 67:36-50, 71:63-72:04, 72:53-66, 73:27-40, Figs. 14, 15A, 15B, 16A, and 16B. Function: "applying an advanced reservation algorithm"	Structure: MAC downlink subframe scheduler 1566 or MAC uplink subframe scheduler 1666 implementing an algorithm that determines the latency and jitter sensitivity of flows and then determines how to assign slots based on that determination (e.g., periodically or not, with what period), as described at '971 Patent 51:11-23, 61:6-16, 61:65-62:7, 62:32-37, Fig. 14. Function: "applying an advanced reservation algorithm"

IV's construction is verbatim from the specification

IV's Construction

Structure: MAC subframe schedulers 1566 or 1666 configured to assign future slots to data packets based on the priority of the IP data flow with which the packet is associated, as described at '971 Patent 23:14-35, 61:35-62:56, 63:47-57, 66:7-15, 67:36-50, 71:63-72:04, 72:53-66, 73:27-40, Figs. 14, 15A, 15B, 16A, and 16B.

Function: "applying an advanced reservation algorithm"

> In the present invention, an advanced reservation algorithm assigns future slots to data packets based on the priority of the IP data flow with which the packet is associated. Exemplary priorities are described above with

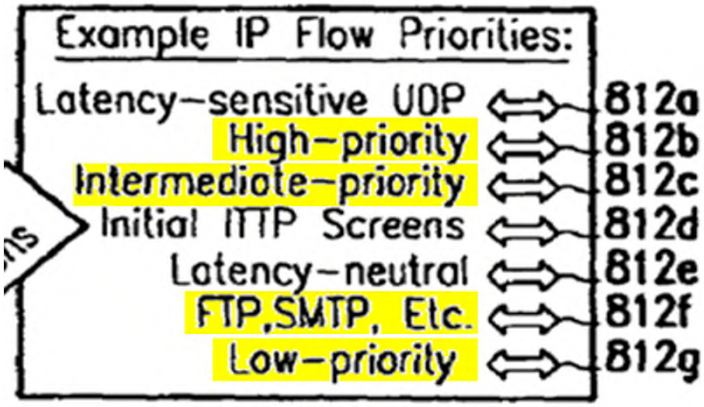
'971 Patent at 61:65-62:1

Defendants' construction is improperly limiting

- Defendants' construction improperly limits priorities to latency and jitter.
- The specification describes several other exemplary priorities.

In the present invention, an advanced reservation algorithm assigns future slots to data packets based on the priority of the IP data flow with which the packet is associated. Exemplary priorities are described above with respect to FIGS. **8**A and **8**B. For calls that are sensitive to jitter, meaning calls that are time sensitive, it is important to maintain an isochronous (i.e., in phase with respect to time) connection. With such signals, it is important that the data be dispersed in the same slot between frames, or in slots having a periodic variation between frames. For example, vertical

'971 Patent at 61:65-62:7



'971 Patent at Fig. 8A & 8B

Terms 13 & 14: “means for reserving a first slot . . .” and “means for reserving a second slot . . .”

"means for reserving a first slot for a first data packet of an Internet Protocol (IP) flow in a future transmission frame based on said algorithm"

> 12. A quality of service (QoS) aware, wireless communications system comprising:
>
> ...
>
> means for reserving a first slot for a first data packet of an Internet Protocol (IP) flow in a future transmission frame based on said algorithm:

'971 Patent, claim 12

IV's Construction	Defendants' Construction
Structure: MAC subframe schedulers 1566 or 1666 configured to reserve slots in a future transmission frame in accordance with one or more of the patterns shown in Figure 14, by reserving a slot one or more frames in the future, or as described at '971 Patent 23:14-35, 61:35-62:56, 63:47-57, 66:7-15, 67:36-50, 71:63-72:04, 72:53-66, 73:27-40, Figs. 14, 15A, 15B, 16A, and 16B. Function: "reserving a first slot for a first data packet of an Internet Protocol (IP) flow in a future transmission frame based on said algorithm"	Structure: MAC downlink subframe scheduler 1566 or MAC uplink subframe scheduler 1666 implementing an algorithm for assigning a first future slot that is at least one frame in the future from the current frame based on the determination by the reservation algorithm of the latency- and jitter-sensitivity of the flows, as described at '971 Patent 62:7-17, 62:46-54, 67:36-47, 73:27-37, Fig. 14. Function: "reserving a first slot for a first data packet of an Internet Protocol (IP) flow in a future transmission frame based on said algorithm"

"means for reserving a second slot for a second data packet of said IP flow in a transmission frame subsequent in time to said future transmission frame based on said algorithm"

means for reserving a second slot for a second data packet of said IP flow in a transmission frame subsequent in time to said future transmission frame based on said algorithm,

'971 Patent, claim 12

IV's Construction	Defendants' Construction
Structure: MAC subframe schedulers 1566 or 1666 configured to reserve slots in a second future transmission frame, in accordance with one or more of the patterns shown in Figure 14, by reserving a slot two or more frames in the future, or as described at '971 Patent 23:14-35, 61:35-62:56, 63:47-57, 66:7-15, 67:36-50, 71:63-72:04, 72:53-66, 73:27-40, Figs. 14, 15A, 15B, 16A & 16B. Function: "reserving a second slot for a second data packet of said IP flow in a transmission frame subsequent in time to said future transmission frame based on said algorithm"	Structure: MAC downlink subframe scheduler 1566 or MAC uplink subframe scheduler 1666 implementing an algorithm for assigning a second future slot in a frame that is at least two frames in the future from the current frame based on the determination by the reservation algorithm of the latency- and jitter-sensitivity of the flows, as described at '971 Patent 62:7-17, 62:46-54, 67:36-47, 73:27-37, Fig. 14. Function: "reserving a second slot for a second data packet of said IP flow in a transmission frame subsequent in time to said future transmission frame based on said algorithm"

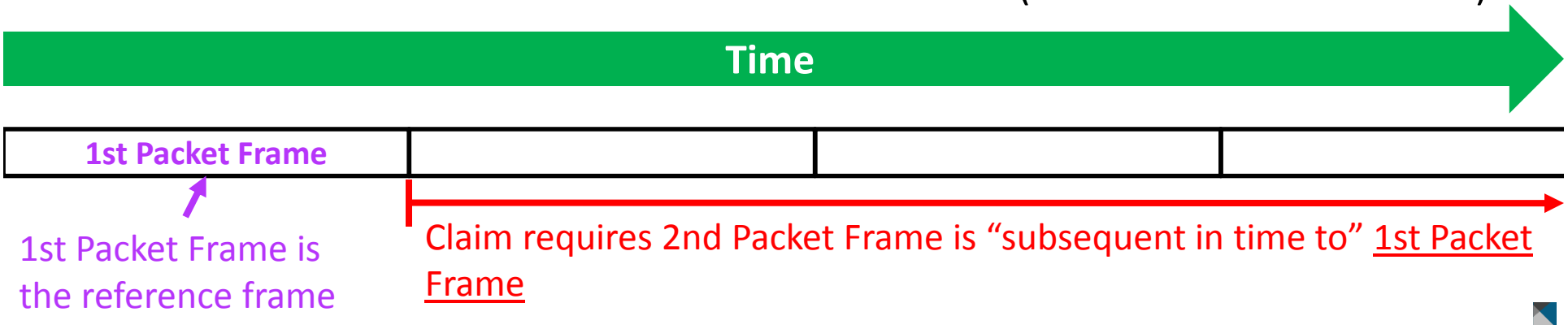
Claim is directed to scheduling packets for the future

- Claim 12 is directed towards scheduling packets in the future.

> means for reserving a first slot for a first data packet of an Internet Protocol (IP) flow in a future transmission frame based on said algorithm:
> means for reserving a second slot for a second data packet of said IP flow in a transmission frame subsequent in time to said future transmission frame based on said algorithm,

'971 patent, claim 12

  - Reserve slot for first data packet in a "future transmission frame" ("1st Packet Frame")
  - Reserve slot for second data packet in a "transmission frame subsequent in time to" 1st future frame ("2nd Packet Frame")
  - Reference frame is "future transmission frame" (a.k.a. "**1st Packet Frame**")



Defendants' construction is confusing

Defendants' Construction

Structure: MAC downlink subframe scheduler 1566 or MAC uplink subframe scheduler 1666 implementing an algorithm for assigning a first future slot **that is at least one frame in the future from the current frame** based on the determination by the reservation algorithm of the **latency- and jitter-sensitivity** of the flows, as described at '971 Patent 62:7-17, 62:46-54, 67:36-47, 73:27-37, Fig. 14.

Function: "reserving a first slot for a first data packet of an Internet Protocol (IP) flow in a future transmission frame based on said algorithm"

- Defendants unnecessarily introduce the concept of a "current frame," which is ambiguous and will lead to jury confusion.

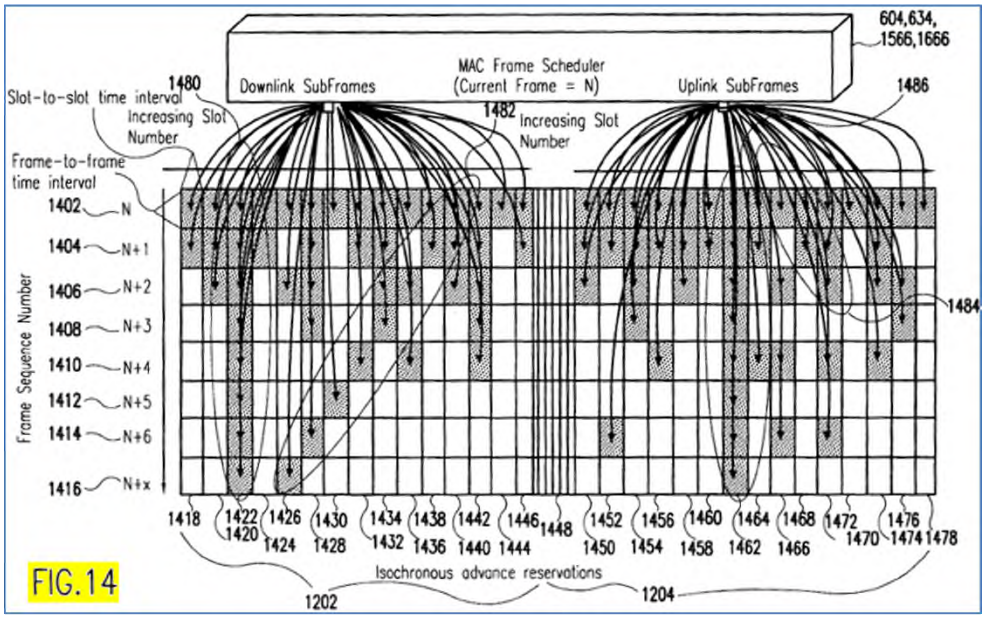
IV's construction is supported by the specification

with respect to FIGS. **16**A and **16**B). Flow scheduler **604** and **1566**, and **634** and **1666**, uses these downstream reservations and upstream reservation requests to assign slots to data packets in the next downstream transmission subframe **1202** and upstream transmission sub frame **1204**, respectively.

FIG. **14** is an exemplary two-dimensional block diagram **1400** of the advanced reservation algorithm. FIG. **14** includes MAC subframe scheduler **1566**, **1666**, frames current frame, n **1402**, and future frames, n+1 **1404**, n+2 **1406**, n+3 **1408**, n+4 **1410**, n+5 **1412**, n+6 **1414** . . . n+x **1416**, representing frames of data packets to be transmitted at times n, n+1, n+2 . . . n+x. Each frame is divided into a

Claim 12 is directed to scheduling packets by reserving slots in future frames.

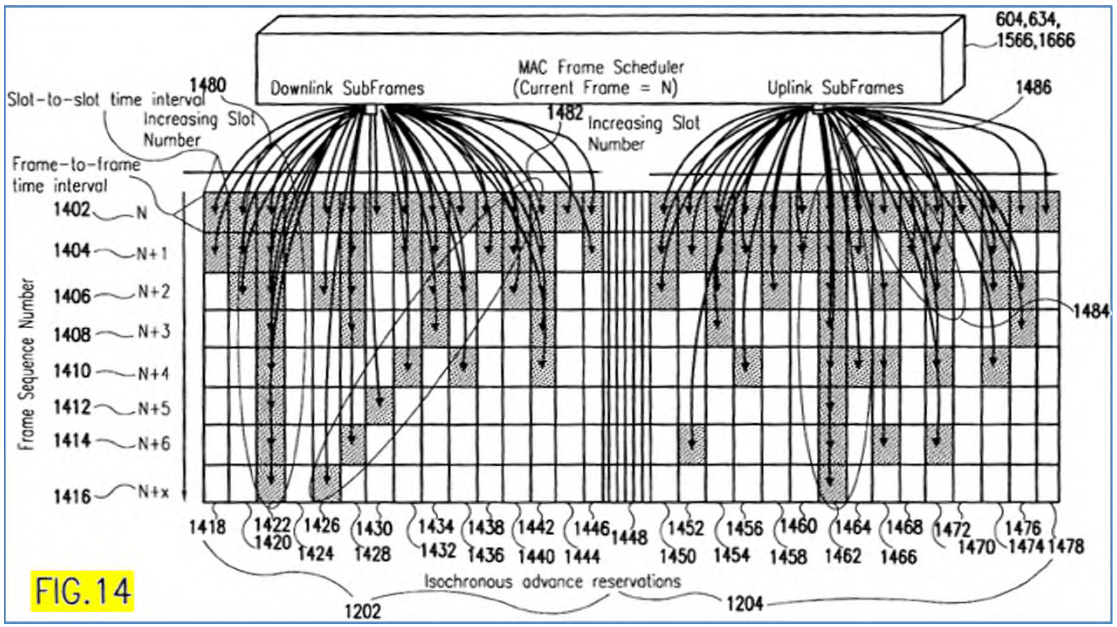
'971 Patent at 61:35-46



Defendants' construction is confusing in light of Figure 14

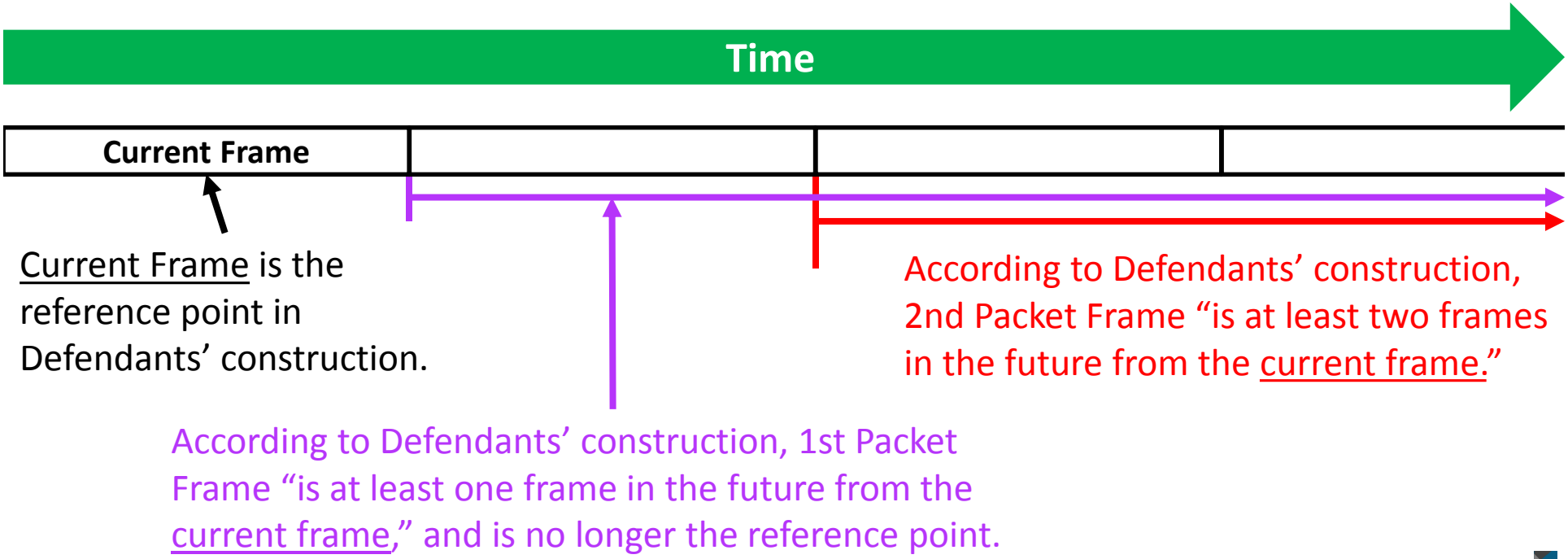
- Defendants' usage of current frame does not allow advanced reservation algorithm to make reservations in the current frame.

  - But Figure 14 depicts frames in which a scheduler may reserve slots for data packets.
  - Figure 14 shows the scheduler reserving slots in Frame N (*i.e.*, current frame)
  - If scheduler cannot reserve slots in current frame, then no need to include it in this figure.



Defendants' construction is confusing

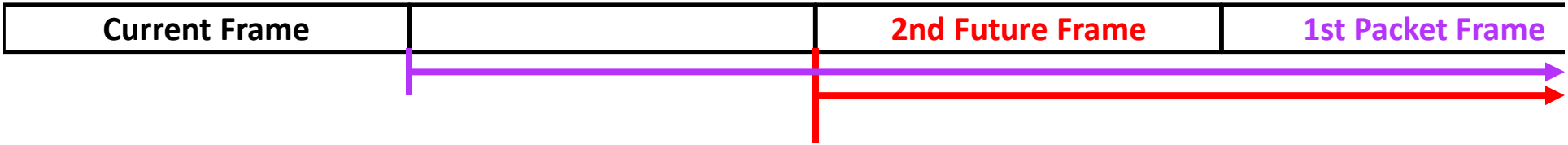
- Defendants eliminate 1st Packet Frame as a reference point by adding "current frame" and using it as a reference point
  - Defendants' construction for 1st Packet Frame: "is at least one frame in the future from the current frame"
  - Defendants' construction: 2nd Packet Frame: "is at least two frames in the future from the current frame"



Defendants' construction is confusing

- Defendants' use of "current frame" as reference point reads out claim limitation defining the relationship between future frames – leading to absurd results:

Ex. 1: Defendants' construction allows 2nd Packet Frame to precede 1st Packet Frame (which is opposite of claim's requirement to be subsequent to 1st Packet Frame).



Ex. 2: Defendants' construction allows 2nd Packet Frame to be in same frame as 1st Packet Frame (opposite of claim requirements and not isochronous).

Term 15: “means for taking into account service level agreement (SLA) based priorities for said IP flow”

"means for taking into account service level agreement (SLA) based priorities for said IP flow"

18. The system of claim 12, wherein said scheduler comprises:

means for taking into account service level agreement (SLA) based priorities for said IP flow.

'971 Patent, claim 18

IV's Construction	Defendants' Construction
Structure: Downlink scheduler 604/1566 or uplink scheduler 634/1666 configured to use information from SLA priority data table 1570 to affect the queueing function and provide different service levels to users. Function: "taking into account service level agreement (SLA) based priorities for said IP flow"	Structure: downlink scheduler 604/1566 or uplink scheduler 634/1666 implementing an algorithm that increases or decreases queuing priority of an IP flow based on the service level agreement of the user associated with the IP flow, as described at '971 Patent 53:49-57, 53:34-36, 66:57-63. Function: "taking into account service level agreement (SLA) based priorities for said IP flow"

IV's construction is directly from the specification

IV's Construction

Structure: Downlink scheduler 604/1566 or uplink scheduler 634/1666 configured to use information from SLA priority data table 1570 to affect the queueing function and provide different service levels to users.

Function: "taking into account service level agreement (SLA) based priorities for said IP flow"

Downlink flow scheduler **604** places the data packets of an IP data flow into a class queue, and based on a set of rules, schedules the data packets for transmission over the wireless medium to a subscriber CPE station using, e.g., an advanced reservation algorithm. The rules can be determined by inputs to the downlink flow scheduler from a hierarchical class-based priority processor module **1574**, a virtual private network (VPN) directory enabled (DEN) data table **1572**, and a service level agreement (SLA) priority data table **1570**. The advanced reservation algorithm is described further above with respect to FIG. **14**.

'971 Patent at 63:47-56

Defendants' construction excludes all but one embodiment

- Defendants' construction improperly limits the scope to a single embodiment of "an algorithm that increases or decreases queueing priority of an IP flow."
- The specification contemplates other embodiments that allocate slots based on SLA priorities without changing the queueing priority.

904*a*, **906***a* and **908***a*, respectively. PRIMMA MAC scheduler **604**, **634** of wireless base station **302** can take into account SLA-based priorities in allocating available bandwidth to the subscriber CPE IP flows **902***b*, **904***b*, **906***b* and **908***b*. In the example illustration, IP flow **902***b* can be allocated frame slot **902***c* based on SLA priority **902***a*. Frame slots **904***c*, **906***c* and **908***c* can be similarly scheduled taking into account SLA priorities. Uplinked IP flow traffic

'971 Patent at 53:49-57

Terms 17 & 18: “the analyzed contents” / “the analyzed packet contents”

"the analyzed contents" / "the analyzed packet contents"

IV's Construction	Defendants' Construction
Plain meaning, "the portion of the packets previously analyzed"	"analyzed contents of the packets to be communicated over the shared wireless bandwidth in the downlink direction"

allocating the shared wireless bandwidth between the wireless base station transmitting in the downlink direction and the at least one CPE station transmitting in the uplink direction based on the analyzed contents and the

'517 Patent, claim 1

the reservation requests, and wherein the controller is configured to allocate wireless bandwidth between the uplink direction and the downlink direction responsive to the analyzed packet contents and the analyzed reservation requests, and wherein the controller is configured

'517 Patent, claim 12

There is no dispute about antecedent basis

'517 Patent, claim 1

analyzing contents of packets to be communicated over the shared wireless bandwidth in a downlink direction from a wireless base station to at least one customer premises equipment (CPE) station;

allocating the shared wireless bandwidth between the wireless base station transmitting in the downlink direction and the at least one CPE station transmitting in the uplink direction based on the analyzed contents and the

'517 Patent, claim 12

base station to the at least one CPE station, and wherein the controller is configured to analyze contents of the packets received from the first interface and to analyze the reservation requests, and wherein the controller is configured to allocate wireless bandwidth between the uplink direction and the downlink direction responsive to the analyzed packet contents and the analyzed reservation requests, and wherein the controller is configured

- There is no dispute about antecedent basis.
- Antecedent basis is found in the preceding step of "analyzing contents of packets" / "analyze contents of the packets."

Defendants' construction unnecessarily repeats limitations already found elsewhere in the claim

'517 Patent, claim 1

analyzing contents of packets to be communicated over the shared wireless bandwidth in a downlink direction from a wireless base station to at least one customer premises equipment (CPE) station;

allocating the shared wireless bandwidth between the wireless base station transmitting in the downlink direction and the at least one CPE station transmitting in the uplink direction based on the analyzed contents and the

'517 Patent, claim 12

wherein the controller is configured to receive packets from the wired data network via the first interface to be communicated in a downlink direction from the wireless base station to the at least one CPE station, and wherein the controller is configured to analyze contents of the packets received from the first interface and to analyze the reservation requests, and wherein the controller is configured to allocate wireless bandwidth between the uplink direction and the downlink direction responsive to the analyzed packet contents and the analyzed reser-

- Defendants' construction is unhelpful and confusing—it repeats a limitation that a packet is "to be communicated over the shared wireless bandwidth in the downlink direction."
- This limitation is already present in the analyzing/analyze step, and it is <u>not</u> required again in the allocating/allocate step.

Defendants' construction unnecessarily repeats limitations already found elsewhere in the claim

- Substituting Defendants' construction into Claim 1 Leads to Confusion:

analyzing contents of ***packets to be communicated over the shared wireless bandwidth in a downlink direction*** from a wireless base station to at least one customer premises equipment (CPE) station;

…

allocating the shared wireless bandwidth … based on the analyzed contents [**analyzed contents of the packets to be communicated over the shared wireless bandwidth in the downlink direction**] and the analyzed reservation requests

Defendants' construction unnecessarily repeats limitations already found elsewhere in the claim

- Substituting Defendants' construction into Claim 12 Leads to Confusion:

wherein the controller is configured to receive ***packets …. to be communicated in a downlink direction*** from the wireless base station to the at least one CPE station …

wherein the controller is configured to allocate wireless bandwidth … responsive to the analyzed packet contents [**analyzed contents of the packets to be communicated over the shared wireless bandwidth in the downlink direction**] …

Terms 19 & 20: “allocating the shared wireless bandwidth” / “allocate wireless bandwidth”

"allocating the shared wireless bandwidth between the wireless base station transmitting in the downlink direction and the at least one CPE station transmitting in the uplink direction"

IV's Construction	Defendants' Construction
Plain meaning, no construction necessary	"allocating the shared wireless bandwidth between **[(1)]** the wireless base station transmitting in the downlink direction and **[(2)]** the at least one CPE station transmitting in the uplink direction"

allocating the shared wireless bandwidth between the wireless base station transmitting in the downlink direction and the at least one CPE station transmitting in the uplink direction based on the analyzed contents and the analyzed reservation requests, . . .

'517 Patent, claim 1

"allocate wireless bandwidth between the uplink direction and the downlink direction responsive to the analyzed packet contents and the analyzed reservation requests"

IV's Construction	Defendants' Construction
Plain meaning, no construction necessary	"allocate wireless bandwidth between **[(1)]** the uplink direction and **[(2)]** the downlink direction responsive to the analyzed packet contents and the analyzed reservation requests"

the controller is configured to analyze contents of the packets received from the first interface and to analyze the reservation requests, and wherein the controller is configured to allocate wireless bandwidth between the uplink direction and the downlink direction responsive to the analyzed packet contents and the analyzed reservation requests, and wherein the controller is configured to allocate slots in a frame to the reservation requests responsive to the allocated bandwidth, and wherein the

'517 Patent, claim 12

Defendants' construction is unhelpful

Defendants' Construction
"allocating the shared wireless bandwidth between **[(1)]** the wireless base station transmitting in the downlink direction and **[(2)]** the at least one CPE station transmitting in the uplink direction"

- Defendants' construction merely adds a "**(1)**" and a "**(2)**."
  - This notation has no clear meaning.

- No construction is necessary for the jury to understand this term.

Disconnect between Defendants' construction and Defendants' briefing

- The notation "(1)" and "(2)" does not convey the complex and narrow meaning that Defendants present in their brief.
- Defendants' brief suggests that "(1)" and "(2)" somehow requires:
  - allocating "dynamically";
  - use of "variable length downlink subframe"; and
  - use of "variable length uplink subframe."
- If Defendants meant to propose a construction with these narrow limitations, they should have asked for it.

Defendants' brief imports limitations from the specification

- The "dynamic" allocation using "variable length" subframes is part of ***one embodiment***.
  - '517 patent, 52:65-53:2 (fields shown in Figs. 12A-12O including the variable length subframes 1202 and 1204 "merely refer to one embodiment of the present invention, and are not limiting to the numerous implementations of the present invention")
- Defendants offer no reason for importing these limitations into independent claims 1 and 12.

Claim differentiation weighs against Defendants' construction

- Claim differentiation weighs against Defendants' arguments because dependent claims 2 and 13 add the limitation of allocating "dynamically."

> **2**. The method according to claim **1** wherein the bandwidth is allocated dynamically between the uplink direction and the downlink direction for each frame.

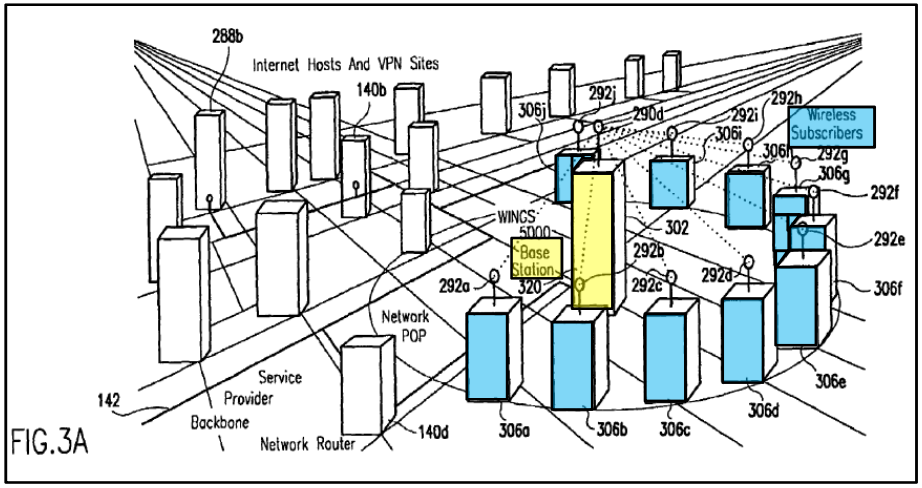
'517 Patent, claim 2

> **13**. The wireless base station as recited in claim **12** wherein the controller is configured allocate the wireless bandwidth dynamically for each frame.

'517 Patent, claim 13

Defendants ignore the context of the claims

- Defendants focus exclusively on allocating between **uplink and downlink** directions.
- Defendants ignore the overall context of the claims which call for allocating between "**a wireless base station**" and "**at least one CPE station**."



- Reading the claims as a whole, "allocating between" means allocating some bandwidth to the base station, some to the first CPE, some to the second CPE, and so on.

Term 10: “said plurality of packets”

"said plurality of packets"

IV's Construction	Defendants' Construction
Plain meaning, "said two or more packets"	**Modified 4-3 Construction:** "'the plurality of packets' that are scheduled for communication ~~communicated~~ over a shared wireless bandwidth are the same plurality of packets that are classified" **Alternate construction:** "the same plurality of packets that are classified"

109. A method for scheduling packets comprising:
classifying a plurality of packets according to end-user quality of service (QoS) requirements of said plurality of packets; and
scheduling said plurality of packets for communication in at least one of an upstream direction and a downstream direction over a shared wireless bandwidth according to a scheduling algorithm.

'206 Patent, claim 109

IV's construction is the plain meaning

IV's Construction
Plain meaning, said two or more packets

- This term should be given its plain meaning.
  - Patentee did not act as his own lexicographer. *See* '206 Patent, Table I (defining myriad terms, but not "said plurality of packets").
- IV's construction simply acknowledges the antecedent basis, and recognizes that "plurality" means two or more.
  - Defendants' criticism that IV is ignoring antecedent basis lacks merit. *See* D.I. 110 (Amended 4-3 Statement) at 14.

Defendants' constructions are circular and confusing

Substituting Defendants' Construction into the claims demonstrates that the constructions are circular and confusing to a trier of fact:

'206 Pat. Cl. 109, Lim. [a] with Defendants' Modified 4-3 Construction	**'206 Pat. Cl. 109, Lim. [a] with Defendants' Alternate Construction**
classifying a plurality of packets according to end-user quality of service (QoS) requirements of ['the plurality of packets' that are scheduled for communication communicated over a shared wireless bandwidth are the same plurality of packets that are classified]	classifying a plurality of packets according to end-user quality of service (QoS) requirements of [the same plurality of packets that are classified]

Inventor Testimony

Inventor testimony not relevant to claim construction

- Inventor statements carry "little if any significance in . . . claim construction proceedings."
  - *Raytheon Co. v. Cray, Inc.*, No. 2:15-CV-1554-JRG, 2017 WL 3034662, at *5 (E.D. Tex. July 18, 2017)

- Inventor testimony is "limited by the fact that an inventor understands the invention but may not understand the claims, which are typically drafted by the attorney prosecuting the patent application."
  - *Howmedica Osteonics Corp. v. Wright Med. Tech.*, Inc., 540 F.3d 1337, 1346-47 (Fed. Cir. 2008).

Defendants mischaracterize inventor testimony on the "reserving" means

- Defendants mischaracterize inventor testimony regarding "current frame."

> Q. There's a legend that says: "Current frame = N." What does that mean?
>
> A. It's just a reference point. It's the one that is just about to be released to the radio for transmission, if it's downlink.

Jorgensen Tr. 196:2-6

- Inventor testimony regarding "current frame" was not a reference point for any reserving means.

Inventor testimony on "allocating" directed to a preferred embodiment

- Inventor testimony regarding allocation of slots in downlink and uplink directions was with respect to a **prototype system**.

> Q. And was the idea that as there was more demand on the downlink side, you'd be able to allocate more room on the downlink side of the frame; and vice versa, if you had more demand on the uplink, you could allocate more on the uplink side of the frame?
>
> THE WITNESS: The way our system worked was that the number of slots in each direction could be changed based on demand.

Jorgensen Tr. 232:7-16

- This preferred embodiment is described in dependent claims 2 and 13.

> **2**. The method according to claim **1** wherein the bandwidth is allocated dynamically between the uplink direction and the downlink direction for each frame.

'517 Patent, claim 2

Inventor testimony on "optimize" terms

- Inventor testimony on "optimize" terms referenced a prototype system, not the patents-in-suit.

Q. At the end of this paragraph it has the word: "applications." What's an application, as you used that term?

A. **With respect to our system**, we were referring to the applications that generated the particular data streams. So as an example, a voice over IP application would be generating the voice over IP data stream.

Jorgensen Tr. 63:17-24

Inventor testimony on "isochronous"

- Inventor testimony on "isochronous" referenced a prototype system, not the patents-in-suit.

Q. Is that a document that came from your files from Malibu Networks?

A. Yes.

Q. If you turn to page JORGEN 923. There's a slide that says, "WINAAR Architecture Basic Concepts."

* * *

Q. The fifth bullet point down says: "Packets are buffered and prioritized into classes (isochronous/asynchronous available)..."

* * *

Q. What does the word "isochronous" refer to?

A. Constant in time.

Jorgensen Tr. 204:22-206:10

Inventor testimony on "host workstation"

- Inventor testimony on "host workstation" lacked context.

Q. Do you know what a host workstation is?

THE WITNESS: Host workstation sounds like a general term that could have different meanings, so, no, I don't.

Q. So **it would depend on the context** to determine what a host workstation is?

A. At least, yes.

Q. What about a host computer? Do you know what that means?

A. Again, **it depends on the context**.

Q. Do you think a host computer is different than a host workstation?

THE WITNESS: It may or may not be. **It depends on the context**.

Jorgensen Tr. 355:7-23